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U.S. DEPARTMENT OF AGRICULTURE
HARVESTING AND SELLING SEED
OF SOUTHERN PINES



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U.S. DEPARTMENT OF AGRICULTURE

HARVESTING AND SELLING SEED OF SOUTHERN PINES

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Seed of the southern pines—longleaf, slash, loblolly, and shortleaf pine—is becoming a recognized cash crop in many parts of the South. Because local seed is preferable for forest planting, farmers and other collectors near large planting operations have an especially good chance to sell cones or seed. Success in the seed trade, however, requires considerable knowledge of seed, as well as good business methods.

The Main Problem in Collecting Seed

The main problem, whether the collector sells cones or seed, is to make sure that the seed can be extracted from the cones alive and uninjured (fig. 1).

Under natural conditions the living seeds are freed from cones that open while still on the tree. These cones are exposed to warm, moving air, and often to direct sunshine, and have plenty of room in which to open. It is easy to see the importance of giving the cones in the seed-extracting plant equally good conditions of warm, moving air, room for expansion, and possibly direct heat.

When the seeds are freed from the cones under natural conditions, the cones are already dead. During most of their two growing seasons on the tree, southern pine cones are very much alive; they are green and juicy, and if picked will be found so heavy that they will sink in water. In the fall of their second year, however, they suddenly begin to lose weight while still attached to the tree. When this happens, the cones may be considered ripe. They remain closed for another 3 to 5 weeks, during which they continue to lose weight, and then, given a few days of dry weather, they open and the seeds are shed. The natural death of the cones appears to take place at some time between the first loss of weight and the shedding of the seed. To extract seed successfully, it is necessary not only to give the cones good conditions under which to open, but also to collect and store them so that they will die a natural death. This means that they must not be picked before they are ripe nor be allowed to mold seriously or to turn sour.

Every step of collection and extraction should be planned and carried out to meet these needs, as well as to save unnecessary handling of cones or loss of time. In addition, if the collector is selling cones, he must first decide how many bushels he may safely undertake to deliver and then get the orders or contracts before actually collecting and delivering the cones. If he is selling seed, he must decide how many extra bushels of cones to collect as a safeguard against low seed yields per bushel and against late orders. Then he must collect the cones, extract the seed, clean it, and deliver it correctly labeled and in good condition.



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FIGURE 1.—Cones of longleaf, slash, shortleaf, and loblolly pine, photographed against a background of 1-inch squares.

Equipment Needed

Seed can often be collected and extracted with no equipment but a supply of old sacks and a rough shed or other cover to protect the cones from rain during drying. Much more efficient work is possible with the help of some bushel baskets, a few rough wooden trays with screen-wire bottoms, a cone tumbler, and perhaps light ladders and some collecting poles for use in standing trees. Most of this equipment can be made at home at little cost. Extraction of several hundred pounds of seed a year may make it necessary to build extra sheds and trays and to buy some special equipment, such as climbing irons and a small seed mill.

Scouting for Cones

By May the cones that will ripen in September or October are large enough to be counted easily. Counts of the cones on a few dozen trees, combined with the figures in table 1, will give a fair idea of the number of bushels that can be collected in any one place. If several hundred bushels are to be collected, it may pay to count cones on more trees, perhaps on strips or plots regularly spaced throughout the forest, like those used in estimating timber.

A bushel of sound, unopened cones ordinarily yields from two-thirds of a pound to a trifle more than a pound of clean seed. It is well, however, before depending on these figures, to cut open two or three cones from each of several trees and make sure that at least half of the seeds have kernels in them.

TABLE 1.—*Numbers of southern pine cones needed to make up a bushel*

Species	Usual ¹	Lowest observed	Highest observed
Longleaf.....	100	86	118
Slash.....	200	157	243
Loblolly.....	500	393	1,080
Shortleaf.....	2,000	1,444	2,545

¹ Cones from vigorous young trees are likely to run fewer to the bushel, and those from very old trees more to the bushel.

If collection is to be from standing trees instead of trees felled in logging, those bearing less than 20 cones apiece should be passed by in estimating the crop, and cones out of reach of climbers should not be counted; otherwise, actual collection will fall short of the estimate.

If the collector plans to get cones from timber belonging to someone else, an important part of scouting for a supply is to get the owner's written permission to collect.

Orders, Contracts, and Prices

Placing orders for seed before the collecting season opens is to the advantage of both buyer and seller. The best business arrangement is a written contract, agreed upon after the collector has scouted for cones but before he has begun to collect.

A contract for cones should state plainly:

1. The species and quality of cones, and treatment before delivery.
2. The unit of measurement. (Sale by the bushel of unopened cones is much fairer than sale by weight, which changes rapidly during the collecting season.)
3. Price per unit and point of delivery.
4. Frequency of shipment by collector or of pick-up by buyer. (Preferably once a week or oftener, to prevent molding in the sacks.)
5. Largest quantity the buyer will accept at the contract price.

A contract for seed should state:

1. Species, quality, and treatment.
2. Unit of measurement.
3. Price per unit and point of delivery.
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Prices for both cones and seed depend on ease of collection, competition among dealers, and many other things; they change considerably from year to year. Actual cost of reasonably efficient collecting or of collecting and extracting, plus 20 percent for profit and risk, is suggested as a fair price for cones and seed. Cones or seed selected from the best trees or stands should bring special prices.

Date of Collection

A rough guide to the date of collection is given in table 2. An important point is the early ripening of slash pine cones. The exact time to begin collecting any species differs from place to place and from year to year and can be told only by keeping close watch of the cones themselves.

It is recommended that no cones be collected for seed extraction until freshly picked sample cones from different trees will float well in water—a better guide than day of the month or color of the cones.

TABLE 2.—*Usual dates of maturity, collection, and natural opening of southern pine cones from Georgia and Florida to Texas*

Species	Maturity	Collection	Opening on trees
Longleaf.....	Oct. 1-20.....	Oct. 1-20.....	Oct. 20-Nov. 10.
Slash.....	Sept. 1-10.....	Sept. 1-20.....	Sept. 20-30.
Loblolly.....	Sept. 20-Oct. 10.....	Oct. 1-20.....	Oct. 10-30.
Shortleaf.....	Oct. 1-20.....	Oct. 11-30.....	Nov. 1.

Gathering and Shipping Cones

Cones are most easily collected from trees felled in logging. They should be gathered, however, only from trees cut after the cones have ripened.

The next easiest way is by climbing trees less than 40 or 50 feet high. Young trees, contrary to common belief, usually produce fully as good seed, and as much per bushel of cones, as old trees. A light, 8-foot pole, with a sharp-edged hook of strap iron at one end, is a great help in collecting cones by this method.

Collection from taller trees, especially those with long, clear trunks, may require the use of climbing irons and is therefore difficult and expensive; but it may pay if the seed is selling for a fancy price or if cones are scarce on smaller trees.

Wormy cones should never be collected unless seed is very scarce. They yield only one-third to one-half as much seed as sound cones, and the scales break up into little pieces that are practically impossible to separate from the seed and consequently lower its market price.

Trash of all kinds, and especially pine straw, should be removed from the cones before they are put in sacks for shipment; if it is not, buyers are justified in refusing shipment or in removing the trash at the collector's expense. An easy way to get clean cones for shipment, make sure of correct measure, and save time in sacking, is to gather the sound cones in a bushel basket, keeping out all straw and grass, and then pour them into the sacks.

Sacks should never be fastened with wire, because pieces of it may ruin seed-cleaning machinery at the extracting plant. Cones should always be shipped promptly after collection and emptied from the sacks as soon as possible after arrival, to keep them from molding, heating, or becoming injured mechanically if they start to open in the sacks. They should be protected from becoming wet during shipment.

Extracting Seed at Natural Air Temperatures

Extraction at air temperature takes from 2 weeks to 3 months. It takes more space and may yield less seed per bushel of cones than kiln extraction, but requires less complicated equipment and less work and never injures the seed by overheating.

The cones are spread out, preferably only one layer deep, on any convenient trays (see front cover), tarpaulins, shelves, or floor that can be protected from the wet and from mice and birds, and from which the seed can easily be poured or swept up. Direct sunlight, free movement of air, and occasional stirring of the cones all speed up opening. The commonest mistake in air-temperature extraction is piling the cones more than two layers deep.

Extracting by Artificial Heat

Artificial heat is often used to increase the yield of seed from cones and also to open them quickly and reduce the need for storage space. Equipment should be arranged to save waste motion, and great care must be used not to overheat the seed or burn up the kiln.

A simple, fairly inexpensive cone kiln can be installed in any room or building of convenient size. The walls should be tight and well enough insulated to prevent great loss of heat; the ceiling, also well insulated, should be without openings and preferably low, just above the topmost trays of cones. Cold-air inlet, stove, tiers of cone trays, and outlets should be arranged so that air entering near the stove, after being heated, will rise through an open space in the center, hit the ceiling, and spread outward to the tops of the tiers of cone trays around the walls. A natural tendency of the air to sink downward through the trays as it is cooled by moisture from the cones should be increased by outlets through the walls at the bottom of the tiers of trays, preferably with a stovepipe running up, outside the kiln, from each outlet to the level of the eaves or higher.

The trays must have bottoms of wire or slats to let the air through. Spreading unopened cones more than one layer deep in the trays interferes seriously with drying. A tray 3 by 4 feet will hold about 1.5 bushels of longleaf cones, 1.1 of slash, 0.8 of loblolly, and 0.6 of shortleaf. Trays must be far enough apart in the tier to allow room for the cones after opening, when they take up two and a half to three and a half times the space they require before opening.

The air reaching the cones should never be hotter than 130° F.; 120° is safer. Seed should probably not be left in the kiln more than 6 or 8 hours at 120° after it has actually fallen out of the cones. At least one thermometer should be kept in the hottest part of the kiln occupied by cones or seed and examined frequently, to make sure the temperature does not become too high.

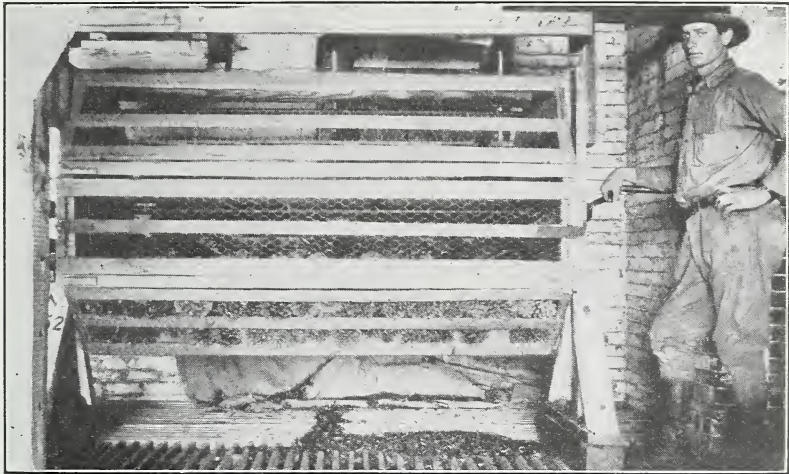
Before being kiln dried, cones picked early in the season and possibly not perfectly ripe should be spread out one to five layers deep for a week or two, much as for ordinary extraction at air temperature. If they are not precured in this way, the artificial heat may injure them so that they will never open. Cones collected toward the end of the season seldom or never need precuring.

Tumbling, Dewinging, and Cleaning

The seed can be shaken out of the opened cones by raking them back and forth on the floor or by tumbling them for a few minutes in a large box with wire sides, turning on a horizontal shaft (fig. 2).

Longleaf pine seed, the wings of which are very hard to remove, is the only kind ordinarily sold with the wings on. The wings of the other species can be removed by rubbing handfuls of the dry seed between the hands, with or without wetting the hands, or by moistening several pounds of seed at once, spreading it in a thin layer, and raking it vigorously every 15 minutes or so until dry. Moistening loosens the wings (except of longleaf seed), but the seed must be thoroughly dried again within a few hours, to prevent its spoiling.

Thoroughly cleaned seed brings the best price and gives the best results in the nursery. Much of the light chaff from rubbing off the wings can be wafted out of the seed by sudden downward movements of a tray with a screen-wire bottom upon which seed and chaff are spread in a thin layer. Much of the rest of the trash, and some empty seeds, can be blown out by pouring the seed slowly from one container



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FIGURE 2.—A home-made cone tumbler with eight sides covered with chicken wire. After tumbling, the cones are emptied out on a tarpaulin laid on the gridwork cover of the seed box below, then dragged away and burned.

to another in a strong wind, or in front of a forge blower or an electric fan. The best device, however, is a regular agricultural seed-cleaning mill with moving screens and a built-in fan.

Storing Seed

For storage over winter, southern pine seed should be dried to a moisture content of slightly less than 10 percent and kept at as low a temperature as possible. For storage of a year or more, a combination of moisture content slightly below 10 percent and temperature between 32° and 40° F. appears to be the only reliable method so far developed, especially for longleaf pine seed. Fairly tight containers, such as large paint cans, appear best for dry seed, but they should not be used for seed at a moisture content much above 10 percent because of danger of spoilage.

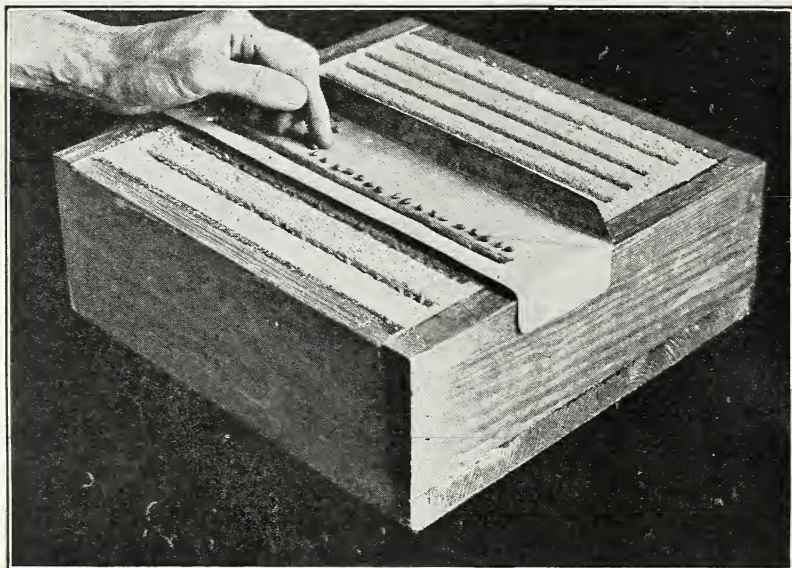
The safest way to reduce seed to the right moisture content for storage is to spread it in a thin layer in the sun for a few hours, stirring it at frequent intervals. If the seed is very moist, this treatment should be repeated for 2 or 3 days.

Testing Seed

Complete tests of tree seed require expensive apparatus and trained workers. A very fair judgment of cleanness, however, can be developed by studying several different samples of seed, both before and after cleaning, and the percentage of empty seeds can be estimated closely by smashing with a hammer a hundred seeds, five seeds at a time.

This should be done for each of four or five parts of a well-mixed sample.

Actual germination percent can be found by growing samples of seed in fine white sand for 30 to 60 days, being careful never to cover the seeds more than one-eighth inch deep, measured from the center of the seed (fig. 3). Considerable experience, however, is needed to get reliable results in such tests.



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FIGURE 3.—Sowing seed in fine white sand to test germination. The metal guide makes it easy to get the seeds into the right drill, where they will be covered lightly with sand.

Labeling for Shipment

No cones or seed should be shipped without a label giving at least the following information:

For both cones and seed: (1) Name and address of collector; (2) species; (3) date of collection; and (4) place of collection (including county and State).

Additional, for seed only: (5) Date and method of extraction; (6) method of dewinging and cleaning; and (7) length and manner of storage.

Sources of Additional Information

More detailed information concerning southern pine seed may be obtained from the Southern Forest Experiment Station, New Orleans, La., the Appalachian Forest Experiment Station, Asheville, N. C., and (concerning kiln extraction) the Forest Products Laboratory, Madison, Wis. For information concerning markets, collectors should consult the State foresters at Montgomery, Ala., Little Rock, Ark., Tallahassee, Fla., Atlanta, Ga., New Orleans, La., Baltimore, Md., Jackson, Miss., Raleigh, N. C., Oklahoma City, Okla., Columbia, S. C., Nashville, Tenn., and College Station, Tex.; and the extension foresters at the State agricultural colleges of the various States.

